

**REMARKS**

The Office Action mailed November 20, 2002, has been received and reviewed. Applicant submitted a Preliminary Amendment mailed on May 14, 2002, receipt of which has not been acknowledged by the Examiner. Applicant Claims 1 through 11 are currently pending in the application. Claims 1 through 11 stand rejected. Applicant has amended claims 1 through 3 and 8 through 11, added claims 12-28 and respectfully requests reconsideration of the application as amended herein.

**35 U.S.C. § 102(b) Anticipation Rejections**

**Anticipation Rejection Based on U.S. Patent No. 5,724,233 to Honda et al.**

Claims 1 through 4 and 6 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,724,233 to Honda et al. ("Honda"). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

In the Honda reference, there is disclosed a lead frame 104 having a first semiconductor chip 103a and second semiconductor chip 103b adhesively attached to the lead frame 104 so that each of the first and second chips 103a and 103b are facing outward. Each of the chips 103a and 103b are electrically interconnected to lead frames 104 and 104a by TAB leads 107a, 107b, 107c and 107d. However, Applicant respectfully submits that the TAB leads are not self-supporting leads.

Further, Honda discloses that lead frame, 104a, as shown in FIG. 19B, does not contact lead frame 104. (Col. 11, lines 61-64). Thus, Honda teaches first and second semiconductor

chips electrically connected to separate lead frames by way of TAB bonded leads fixed to each respective semiconductor chip active surface.

Independent Claim 1 includes attaching lead fingers of a self-supporting first offset lead frame and attaching lead fingers of a second offset lead frame to the primary lead fingers of a base lead frame. Thus, Honda fails to disclose each and every element of the claim because Honda discloses neither self-supporting leads nor a base lead frame.

Applicant respectfully submits that Honda does not disclose each and every element in as complete detail as is contained in independent Claim 1, as presently amended. Accordingly, Applicant respectfully requests reconsideration and allowance of independent Claim 1.

With regard to cantilevered or cantilevering offset lead frames, Applicant respectfully submits that Honda does not disclose such a configuration. As may be seen in FIG. 19A of Honda, the TAB leads are supported on both sides. (FIGS. 19A and 19B).

Claim 2 includes forming the lead fingers of the first and second offset lead frames to respectively extend in a cantilevered manner over the first and second semiconductor dice from locations of attachment of the lead fingers of the first and second offset lead frames to the primary lead fingers.

Applicant respectfully submits that Honda fails to disclose first and second self-supporting offset lead frames with lead fingers that extend in a cantilevered manner as included by presently amended Claim 2. Rather, each of the TAB leads are bonded and fixed to the active surface of the semiconductor chip by a conductive pad 108 by means of inner lead bonding and also bonded and fixed to a respective lead frame (104 or 104a) by outer lead bonding. (Col. 11, lines 17-48; FIGS. 19A and 19B).

Claim 2, as presently amended, is allowable as depending directly from independent Claim 1, which is allowable. Applicant respectfully requests reconsideration and allowance of dependent Claim 2.

Applicant respectfully submits that Honda fails to disclose cantilevering the lead fingers of the self-supporting first and second offset lead frames as included by presently amended Claim

3. Also, Claim 3 is allowable as depending directly from independent Claim 1, which is allowable. Applicant respectfully requests reconsideration and allowance of dependent Claim 3.

Claim 4 is allowable as depending directly from independent Claim 1, which is allowable. Applicant respectfully requests reconsideration and allowance of dependent Claim 4.

Claim 6 depends from Claim 5, which has not been rejected under 35 U.S.C. § 102. Applicant respectfully requests reconsideration and withdrawal of the rejection of dependent Claim 4 under 35 U.S.C. § 102.

### 35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,724,233 to Honda et al. in view of U.S. Patent No. 5,303,120 to Michii et al.

Claims 5 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,724,233 to Honda et al. as applied to claim 1 above, and further in view of U.S. Patent No. 5,303,120 to Michii et al. ("Michii"). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

In the rejection, the Examiner acknowledges the Honda reference is deficient in teaching centrally located bond pads on the first and second semiconductor dice. To overcome this deficiency, the Examiner relies on the Michii reference for teaching bond pads centrally located

on dice. No motivation for the combination of the references in relation to bond pad location is given.

Applicant respectfully disagrees with the combination of Honda and Michii for the following reasons. First, a person of ordinary skill in the art would not have been motivated to make the proposed modification; second, there is no reasonable expectation of success in making the proposed modification.

Turning to the first issue, a person of ordinary skill in the art would not have been motivated to make the proposed modification because the combination of the leads of Michii with Honda renders Honda unsatisfactory for its intended purpose.

The Honda reference expressly teaches that the first and second semiconductor chips be adhesively attached to respective lead frames to prevent displacement and movement in the semiconductor chips 103a, 103b during a transfer molding process. To further prevent displacement of the semiconductor chips 103a, 103b, the TAB leads are directly bonded to pads 108 on the semiconductor chips 103a, 103b. (Col. 11, lines 17-48; Col. 8, lines 37-59; Col. 10, lines 17-29) (describing other embodiments wherein the TAB leads and adhesive are utilized for direct bonding to prevent the semiconductor chips from being displaced and short circuiting); (Col. 3, lines 27-50; FIGS. 6a and 6b) (referencing problems in the prior art of TAB leads and semiconductor dice displacing during a transfer molding process ultimately causing short circuiting therein); (Col. 4, lines 28-34) (disclosing that a specific object of the invention is to provide multiple chips in a package that cannot be displaced during transfer molding).

Turning to the Michii reference, it discloses two packages 40, 50 with lead fingers 44 extending therefrom and bonded to a mounting substrate. Each package includes a semiconductor chip 41 attached to a die paddle 46 with lead fingers disposed over the semiconductor die and wire bonded thereto. Each of the lead fingers extend out of the encapsulation material for bonding to the mounting substrate so that the package is raised above the surface of the mounting substrate. (Col. 5, line 50 - Col. 6, line 23; FIGS. 6-8).

Further, Honda expressly teaches the necessity of directly attaching the TAB lead fingers to the semiconductor die in order to secure the lead fingers and prevent the "unwanted contact" of the lead fingers to the dice due to displacement during transfer molding. (Col. 3, lines 27-50; FIGS. 6a and 6b; col. 4, lines 28-34; col. 8, lines 37-59; col. 10, lines 17-29; col. 11, lines 17-48). Thus, utilizing the lead fingers of Michii in the device of the Honda reference would be in direct opposition to the teachings therein since the lead fingers would be unsecured, and therefore, result in possible displacement and short circuiting.

Therefore, a person of ordinary skill in the art would not have been motivated to make the proposed modification since such modification would result in unsecured lead fingers and therefore, render the Honda reference unsatisfactory for its intended purpose. If a "proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." M.P.E.P. §2143.01 (citing *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984)). Furthermore, since the Honda reference expressly teaches the necessity of securing the lead fingers to the semiconductor dice, the Honda reference teaches away from the proposed modification of utilizing unsecured lead fingers.

Turning to the second issue, even assuming, *arguendo*, that the proposed modification were made, the combination of the prior art teachings do not provide a reasonable expectation of success. Specifically, the Honda reference teaches, first, to bond lead fingers to a respective lead frames and semiconductor dice, and then second, encapsulating the entire assembly. On the other hand, Michii teaches, first, to encapsulate a semiconductor die individually to form a package with lead fingers extending therefrom, and second, bonding the lead fingers extending from two packages (individually encapsulated) to the a mounting substrate. Since the method of Honda teaches encapsulation of two dice to form a package and the method of Michii teaches individually encapsulating each die and then assembling two dice on a mounting substrate, the combination of the Honda reference and Michii reference is incongruent, and thus does not provide a reasonable expectation of success.

For the foregoing reasons, Applicant respectfully submits that dependent Claim 5 is patentable over the Honda reference and the Michii reference. In addition, Claim 5 is allowable as depending directly from independent Claim 1, which is allowable. Therefore, Applicant respectfully requests reconsideration and allowance of dependent Claim 5.

Dependent Claim 7 is allowable as depending indirectly from independent Claim 1, which is allowable. Applicant respectfully requests reconsideration and allowance of Claim 7.

Obviousness Rejection Based on U.S. Patent No. 5,724,233 to Honda et al. in view of U.S. Patent No. 6,252,299 B1 to Masuda et al.

Claims 8 through 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,724,233 to Honda et al. as applied to claim 1 above, and further in view of U.S. Patent No. 6,252,299 B1 to Masuda et al. (“Masuda”). Applicants respectfully traverse this rejection, as hereinafter set forth.

The 35 U.S.C. § 103(a) obviousness rejections of claims 8 through 11 are improper because the references do not teach or suggest all of the claim limitations.

The teachings of Honda are discussed hereinabove. Masuda teaches a dam bar 11 for the first lead frame LF1 and the second lead frame LF2, but Masuda does not disclose a dam bar in relation to a base lead frame. (Col. 10, lines 35-39; col. 11, lines 2-9; FIGS. 3-5, 7, and 8).

Dependent Claim 8, as presently amended, includes primary lead fingers of each group of the base lead frame being laterally spaced and mutually connected by a dam bar extending substantially transversely therebetween, lead fingers of each group of the first self-supporting offset lead frame being laterally spaced and mutually connected by a dam bar extending substantially transversely therebetween, and lead fingers of each group of the second self-supporting offset lead frame being laterally spaced and mutually connected by a dam bar extending substantially transversely therebetween.

Since the Honda reference and Masuda reference, taken alone or in combination, do not teach or suggest all the claim limitations of independent claim 1, Applicant respectfully submits

that such combination of references does not satisfy a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Further, amended Claims 8 through 11 each depend, either directly or indirectly, from independent Claim 1, which is allowable. Applicant therefore respectfully requests reconsideration and allowance of dependent Claims 8 through 11.

#### **New Claims**

Applicants have added new claims 12 through 28, and respectfully submit that same are allowable in light of the art of record herein.

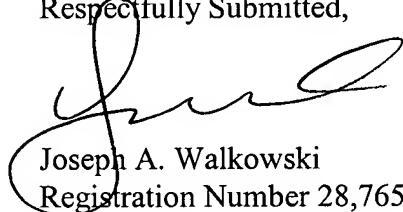
**ENTRY OF AMENDMENTS**

Applicant requests amendments to claims 1 through 3 and 8 through 11 above and new claims 12 through 28 should be entered by the Examiner because they are supported by the disclosure of the application as filed.

**CONCLUSION**

Claims 1-28 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,



Joseph A. Walkowski  
Registration Number 28,765  
Attorney for Applicant  
TRASKBRITT, PC  
P.O. Box 2550  
Salt Lake City, Utah 84110  
Telephone: (801) 532-1922

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Enclosure: Version of Claims with Markings to Show Changes Made

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**VERSION OF CLAIMS WITH MARKINGS TO SHOW CHANGES MADE**

1. (Twice Amended) A method for fabricating a semiconductor die assembly comprising first and second semiconductor dice, the method comprising:  
providing a base lead frame having a die attach site with a first side and a second, opposing side and a plurality of primary lead fingers extending away from the die attach site;  
attaching a first semiconductor die by a back side thereof to the first side of the die attach site with an active surface of the first semiconductor die facing away from the base lead frame;  
attaching a second semiconductor die by a back side thereof to the second side of the die attach site with an active surface of the second semiconductor die facing away from the base lead frame;  
attaching lead fingers of a first self-supporting offset lead frame extending over the first semiconductor die to the primary lead fingers of the base lead frame;  
attaching lead fingers of a second self-supporting offset lead frame extending over the second semiconductor die to the primary lead fingers of the base lead frame; and  
electrically connecting the lead fingers of the self-supporting first and second offset lead frames to bond pads of the first and second semiconductor dice.

2. (Amended) The method of claim 1, further comprising forming the lead fingers of the self-supporting first and second offset lead frames to respectively extend in a cantilevered manner over the first and second semiconductor dice from locations of attachment of the lead fingers of the first and second offset lead frames to the primary lead fingers.

3. (Twice Amended) The method of claim 1, further comprising cantilevering the lead fingers of the self-supporting first and second offset lead frames respectively over the first

and second semiconductor dice from a location of attachment of the lead fingers of the self-supporting first and second offset lead frames to the primary lead fingers.

8. (Twice Amended) The method of claim 1, further comprising:  
configuring the base lead frame with first and second groups of primary lead fingers extending away from the die attach site on opposing sides thereof, the primary lead fingers of each group of the base lead frame being laterally spaced and mutually connected by a dam bar extending substantially transversely therebetween;  
configuring the first self-supporting offset lead frame with first and second groups of lead fingers, the lead fingers of each group of the first self-supporting offset lead frame being laterally spaced and mutually connected by a dam bar extending substantially transversely therebetween, the dam bars of the first self-supporting offset lead frame being mutually spaced so as to be alignable in superimposition with the dam bars of the base lead frame;  
configuring the second self-supporting offset lead frame with first and second groups of lead fingers, the lead fingers of each group of the second self-supporting offset lead frame being laterally spaced and mutually connected by a dam bar extending substantially transversely therebetween, the dam bars of the second self-supporting offset lead frame being mutually spaced so as to be alignable in superimposition with the dam bars of the base lead frame; and  
wherein attaching the lead fingers of the first and second self-supporting offset lead frames to the primary lead fingers of the base lead frame includes aligning the dam bars of the first and second groups of lead fingers of the first and second self-supporting offset lead frames in superimposition with, and on opposing sides of, the dam bars of the first and second groups of primary lead fingers of the base lead frame.

9. (Amended) The method of claim 8, further comprising placing cavities of opposing transfer mold dies over opposing sides of the base lead frame with outer borders of the cavities on opposing sides of the die attach site being located immediately adjacent the superimposed dam bars of the first and second self-supporting offset lead frames and the base lead frame.

10. (Twice Amended) The method of claim 9, further comprising locating the outer borders of the cavities on outer surfaces of the dam bars of the first and second self-supporting offset lead frames.

11. (Twice Amended) The method of claim 9, further comprising injecting a molten, heat-filled polymer encapsulant material into the cavities to encapsulate the first and second semiconductor dice and preventing flow of the encapsulant from the cavities past the primary lead fingers using the superimposed dam bars of the first and second self-supporting offset lead frames and the primary base frame.